

M.5.3.2 Mixed Oxide Fuel Fabrication Facility

Studies of evaluation basis accidents and beyond evaluation basis accidents have been performed for a MOX fuel fabrication at DOE sites and a generic site in the *Fissile Material Disposition Program PEIS Data Call Input Report: Mixed Oxide Fuel Fabrication*. The studies postulated a set of accident scenarios that were representative of the risks and consequences for workers and the public that can be expected if the facility were constructed and operated. Although not all potential accidents were addressed, those that were postulated have consequences and risks that are expected to envelop the consequences and risks of an operating facility. In this manner, no other credible accidents with an expected frequency of occurrence larger than $1.0 \times 10^{-7}/\text{yr}$ are anticipated that will have consequences and risks larger than those described in this section. [Text deleted.]

M.5.3.2.1 Accident Scenarios and Source Terms

A wide range of hazardous conditions and potential accidents were identified as candidates to represent the risks to workers and the public of operating the facility. Through a screening process, four evaluation basis accidents and four beyond evaluation basis accidents were selected for further definition and analysis. Descriptive information on these accidents is provided in Tables M.5.3.2.1-1 and M.5.3.2.1-2. Accident source term information is provided in Tables M.5.3.2.1-3 through M.5.3.2.1-5. Description of accident scenarios are provided in Table M.5.3.2.1-6.

Table M.5.3.2.1-1. Evaluation Basis Accident Scenarios for the Mixed Oxide Fuel Fabrication Facility

Accident Scenario	Accident Frequency (per year)	Source Term at Risk	Source Term Released to Environment
Fire on open loading dock	1.0×10^{-4} to 1.0×10^{-3}	18 g Pu	0.8 g Pu
Fire in process cell	1.0×10^{-5} to 1.0×10^{-3}	24 g Pu	$4.8 \times 10^{-6} \text{ g Pu}$
Leaks or spills from breach of containment	4.5×10^{-5}	4 kg Pu	$1.7 \times 10^{-9} \text{ g Pu}$
Explosion inside a glovebox	1.0×10^{-5} to 1.0×10^{-3}	10 kg Pu	$1.0 \times 10^{-3} \text{ g Pu}$

Source: LANL 1996b.

Table M.5.3.2.1-2. Beyond Evaluation Basis Accident Scenarios for the Mixed Oxide Fuel Fabrication Facility

Accident Scenario	Accident Frequency (per year)	Source Term at Risk	Source Term Released to Environment
Nuclear criticality	1.0×10^{-7}	5.0×10^{17} fissions; gaseous by-products released ^a	^a
Beyond evaluation basis fire	1.0×10^{-7}	24 g Pu	0.034 g Pu
Beyond evaluation basis explosion	1.0×10^{-7}	10 kg Pu	50 g Pu
Beyond evaluation basis earthquake	1.0×10^{-7}	10 kg Pu	25 g Pu

^a See Table M.5.3.2.1-3.

Source: LANL 1996b.

Table M.5.3.2.1-3. Mixed Oxide Fuel Fabrication Facility Criticality Source Terms

Nuclide	Produced (Ci)	Released (Ci)
Kr-83m	5.5	2.75
Kr-85m	3.5	1.75
Kr-85	4.0×10^{-4}	2.0×10^{-4}
Kr-87	21.5	11
Kr-88	11.5	6
Kr-89	650	325
Xe-131m	5.0×10^{-3}	2.5×10^{-3}
Xe-133m	0.1	0.05
Xe-133	1.5	0.75
Xe-135m	165	85
Xe-135	20.5	10
Xe-137	2,450	1,225
Xe-138	550	275
I-131	0.5	0.025
I-132	60	3
I-133	8	0.4
I-134	215	11
I-135	22.5	1.0

Source: LANL 1996b.

Table M.5.3.2.1-4. Mixed Oxide Fuel Fabrication Facility Evaluation Basis Accident Source Terms

Accident Parameter	Accident Scenario			
	Fire on Loading Dock	Fire in Process Cell	Leaks or Spills from Breach of Containment	Explosion Inside Glovebox
Frequency of occurrence (per year)	5.0×10^{-4} ^a	1.0×10^{-4} ^a	4.5×10^{-5}	1.0×10^{-4} ^a
Pu released to environment (g)	0.8	4.8×10^{-6}	1.7×10^{-9}	1.0×10^{-3}
Isotope Released to Environment (curies)				
Pu-238	4.50×10^{-4}	2.70×10^{-9}	9.57×10^{-13}	5.63×10^{-7}
Pu-239	0.0462	2.77×10^{-7}	9.83×10^{-11}	5.78×10^{-5}
Pu-240	0.0109	6.53×10^{-8}	2.31×10^{-11}	1.36×10^{-5}
Pu-241	0.0344	2.06×10^{-7}	7.31×10^{-11}	4.30×10^{-5}
Pu-242	3.14×10^{-7}	1.88×10^{-12}	6.66×10^{-16}	3.92×10^{-10}
Am-241	0.0182	1.09×10^{-7}	3.86×10^{-11}	2.27×10^{-5}

^a Midpoint of the estimated frequency range.

Note: Am=Americium.

Source: Derived from Tables M.5.1.3.4-2 and M.5.3.2.1-1.

Table M.5.3.2.1-5. Mixed Oxide Fuel Fabrication Facility Beyond Evaluation Basis Accident Source Terms

Accident Parameter	Accident Scenario			
	Nuclear Criticality	Beyond Evaluation Basis Fire	Beyond Evaluation Basis Explosion	Beyond Evaluation Basis Earthquake
Frequency of occurrence (per year)	1.0×10^{-7}	1.0×10^{-7}	1.0×10^{-7}	1.0×10^{-7}
Pu released to environment (g)	NA	0.034	50	25
Fissions	5.0×10^{17}	NA	NA	NA
Isotope Released to Environment (Ci)				
Pu-238	0	1.91×10^{-5}	0.0281	0.0141
Pu-239	0	1.97×10^{-3}	2.89	1.44
Pu-240	0	4.62×10^{-4}	0.680	0.340
Pu-241	0	1.46×10^{-3}	2.15	1.08
Pu-242	0	1.33×10^{-8}	1.96×10^{-5}	9.80×10^{-6}
Am-241	0	7.72×10^{-4}	1.13	0.567
Kr-83m	2.75	0	0	0
Kr-85m	1.75	0	0	0
Kr-85	2.0×10^{-4}	0	0	0
Kr-87	11	0	0	0
Kr-88	6	0	0	0
Kr-89	325	0	0	0
Xe-131m	2.5×10^{-3}	0	0	0
Xe-133m	0.05	0	0	0
Xe-133	0.75	0	0	0
Xe-135m	85	0	0	0
Xe-135	10	0	0	0
Xe-137	1,225	0	0	0
Xe-138	275	0	0	0
I-131	0.025	0	0	0
I-132	3	0	0	0
I-133	0.4	0	0	0
I-134	11	0	0	0
I-135	1.0	0	0	0

Note: NA=not applicable.

Source: Derived from Tables M.5.1.3.4-2, M.5.3.2.1-2, and M.5.3.2.1-3.

Table M.5.3.2.1-6. Accident Scenario Descriptions for the Mixed Oxide Fuel Fabrication Facility

Accident Scenario	Accident Description
Evaluation Basis Accidents	
Fire on the loading dock	The fire is caused by welding, cleaning solvents, electrical shorts, or other miscellaneous causes. The scenario assumes an open garage door and that a single drum of combustible waste is involved in the fire.
Fire in a process cell	It is assumed that a process cell contains a glovebox used for final processing of plutonium oxide powder. The gloves, stowed outside the glovebox, are coated with a layer of Pu dust. A flammable cleaning liquid such as acetone or isopropyl alcohol is brought into the process cell in violation of operating procedures, spills, and ignites. The initial extent and intensity of the fire are sufficient to completely incinerate the gloves. The sprinkler system activates and protects the glovebox from further damage. The ventilation system with HEPA filters continues to function throughout the accident.
Deflagration inside a glovebox	The bounding evaluation basis explosion is a deflagration of a flammable gas mixture inside a glovebox. It is assumed that through some unforeseen set of failures, a combustible gas mixture accumulates inside a glovebox and is ignited, possibly by an electrical spark from an operating electrical device. The deflagration blows out the HEPA filter from the glovebox ventilation system exit. Gloves may also be blown out. The room volumes are sufficient to attenuate the pressure wave to levels below that needed to damage the building ventilation system HEPA filters.
Impact-induced spill	The most catastrophic case of leak or spill of nuclear material would result from a forklift or other large vehicle running over a package of nuclear material, breaching the containment, and causing an airborne release to the room. Three-stage HEPA filtration is available for the facility exhaust to limit the release to the environment.
Beyond Evaluation Basis Accidents	
Nuclear criticality	There will not be sufficient quantities of plutonium solutions at the facility to cause a criticality accident. The most likely cause of a criticality event involving Pu oxides would be improper stacking or handling of bulk nuclear material. Multiple operational errors in the material spacing, packing density, manner, and type of containment, and maximum quantities of fissile material permitted in the area would be required for the postulated criticality accident to occur.
Beyond evaluation basis fire in a process cell	A typical fire with coincident failures of two or more major safety systems constitutes a beyond evaluation basis fire. The evaluation postulated the fire in a process cell, discussed above, with the sprinkler system and ventilation system with HEPA filtration inoperative during the accident.
Oxyacetylene explosion in a process cell	The evaluation postulated the explosion of a welding rig oxyacetylene bottle in a process cell. The explosion is sufficient to blow out the HEPA filters and cause significant damage to the ventilation system and nearby equipment.
Beyond evaluation basis earthquake	The following assumptions were used in the evaluation: (1) the earthquake disables the ventilation system; (2) there is significant structural damage to the building but it does not totally collapse; (3) a ceiling slab fall on the glovebox with the most material at risk and severely damages the glovebox; (4) the process cell with the most material at risk is located on an outside wall; (5) the outside wall cracks and the cracks; and (6) the wind is blowing and the cracks are located on the lee side of the building.

Source: LANL 1996b.

M.5.3.2.2 *Accident Impacts*

The estimated impacts of the postulated accidents at each site are provided in Tables M.5.3.2.2–1 through M.5.3.2.2–6. The dose and cancer fatality estimates are based on the analysis of the accident source terms in Tables M.5.3.2.1–4 and M.5.3.2.1–5 using the MACCS computer code. [Text deleted.]

Table M.5.3.2-1. Mixed Oxide Fuel Fabrication Facility Accident Impacts at Hanford Site

Accident Scenario	Worker at 1,000 m		Maximum Offsite Individual		Population to 80 km	
	Dose (rem)	Probability of Cancer Fatality ^a	Dose (rem)	Probability of Cancer Fatality ^a	Dose (person·rem)	Number of Cancer Fatalities ^b
Evaluation basis fire on open loading dock	0.32	1.3×10^{-4}	0.010	5.1×10^{-6}	18.5	9.3×10^{-3}
Evaluation basis fire in process cell	1.9×10^{-6}	7.6×10^{-10}	6.1×10^{-8}	3.0×10^{-11}	1.1×10^{-4}	5.5×10^{-8}
Leaks or spills from breach of containment	6.8×10^{-10}	2.7×10^{-13}	2.2×10^{-11}	1.1×10^{-14}	3.9×10^{-8}	2.0×10^{-11}
Evaluation basis explosion inside a glovebox	4.0×10^{-4}	1.6×10^{-7}	1.3×10^{-5}	6.4×10^{-9}	0.023	1.2×10^{-5}
Nuclear criticality	5.2×10^{-4}	2.1×10^{-7}	1.7×10^{-5}	8.4×10^{-9}	3.4×10^{-3}	1.7×10^{-6}
Beyond evaluation basis fire	0.014	5.4×10^{-6}	4.3×10^{-4}	2.2×10^{-7}	0.79	3.9×10^{-4}
Beyond evaluation basis explosion	19.9	9.4×10^{-3}	0.63	3.2×10^{-4}	1150	0.58
Beyond evaluation basis earthquake	9.9	4.1×10^{-3}	0.32	1.6×10^{-4}	576	0.29
[Text deleted.]						

^a Increased likelihood (or probability) of cancer fatality to a hypothetical individual (a single onsite worker at a distance of 1,000 m or the site boundary, whichever is smaller, or to a hypothetical individual in the offsite population located at the site boundary) if exposed to the indicated dose. The value assumes the accident has occurred.

^b Estimated number of cancer fatalities in the entire offsite population out to a distance of 80 km if exposed to the indicated dose. The value assumes the accident has occurred.

Note: All values are mean values.

Source: Calculated using the source term in Tables M.5.3.2.1-4 and M.5.3.2.1-5 and the MACCS computer code.

Table M.5.3.2.2-2. Mixed Oxide Fuel Fabrication Facility Accident Impacts at Nevada Test Site

Accident Scenario	Worker at 1,000 m		Maximum Offsite Individual		Population to 80 km	
	Dose (rem)	Probability of Cancer Fatality ^a	Dose (rem)	Probability of Cancer Fatality ^a	Dose (person-rem)	Number of Cancer Fatalities ^b
Evaluation basis fire on open loading dock	0.22	8.7x10 ⁻⁵	4.0x10 ⁻³	2.0x10 ⁻⁶	0.42	2.1x10 ⁻⁴
Evaluation basis fire in process cell	1.3x10 ⁻⁶	5.2x10 ⁻¹⁰	2.4x10 ⁻⁸	1.2x10 ⁻¹¹	2.5x10 ⁻⁶	1.3x10 ⁻⁹
Leaks or spills from breach of containment	4.6x10 ⁻¹⁰	1.8x10 ⁻¹³	8.6x10 ⁻¹²	4.3x10 ⁻¹⁵	8.9x10 ⁻¹⁰	4.5x10 ⁻¹³
Evaluation basis explosion inside a glovebox	2.7x10 ⁻⁴	1.1x10 ⁻⁷	5.1x10 ⁻⁶	2.5x10 ⁻⁹	5.2x10 ⁻⁴	2.6x10 ⁻⁷
Nuclear criticality	3.9x10 ⁻⁴	1.5x10 ⁻⁷	6.5x10 ⁻⁶	3.3x10 ⁻⁹	6.6x10 ⁻⁵	3.3x10 ⁻⁸
Beyond evaluation basis fire	9.3x10 ⁻³	3.7x10 ⁻⁶	1.7x10 ⁻⁴	8.6x10 ⁻⁸	0.018	8.9x10 ⁻⁶
Beyond evaluation basis explosion	13.6	6.3x10 ⁻³	0.25	1.3x10 ⁻⁴	26.1	0.013
Beyond evaluation basis earthquake	6.8	2.7x10 ⁻³	0.13	6.3x10 ⁻⁵	13.0	6.5x10 ⁻³
[Text deleted.]						

^a Increased likelihood (or probability) of cancer fatality to a hypothetical individual (a single onsite worker at a distance of 1,000 m or the site boundary, whichever is smaller, or to a hypothetical individual in the offsite population located at the site boundary) if exposed to the indicated dose. The value assumes the accident has occurred.

^b Estimated number of cancer fatalities in the entire offsite population out to a distance of 80 km if exposed to the indicated dose. The value assumes the accident has occurred.

Note: All values are mean values.

Source: Calculated using the source term in Tables M.5.3.2.1-4 and M.5.3.2.1-5 and the MACCS computer code.

Table M.5.3.2.2-3. Mixed Oxide Fuel Fabrication Facility Accident Impacts at Idaho National Engineering Laboratory

Accident Scenario	Worker at 1,000 m		Maximum Offsite Individual		Population to 80 km	
	Dose (rem)	Probability of Cancer Fatality ^a (rem)	Dose (rem)	Probability of Cancer Fatality ^a (rem)	Dose (person·rem)	Number of Cancer Fatalities ^b (per year)
Evaluation basis fire on open loading dock	0.30	1.2x10 ⁻⁴	2.6x10 ⁻³	1.3x10 ⁻⁶	5.5	2.8x10 ⁻³ 5.0x10 ⁻⁴
Evaluation basis fire in process cell	1.8x10 ⁻⁶	7.1x10 ⁻¹⁰	1.5x10 ⁻⁸	7.7x10 ⁻¹²	3.3x10 ⁻⁵	1.7x10 ⁻⁸ 1.0x10 ⁻⁴
Leaks or spills from breach of containment	6.3x10 ⁻¹⁰	2.5x10 ⁻¹³	5.5x10 ⁻¹²	2.7x10 ⁻¹⁵	1.2x10 ⁻¹⁰	5.9x10 ⁻¹² 4.5x10 ⁻⁵
Evaluation basis explosion inside a glovebox	3.7x10 ⁻⁴	1.5x10 ⁻⁷	3.2x10 ⁻⁶	1.6x10 ⁻⁹	6.9x10 ⁻³	3.5x10 ⁻⁶ 1.0x10 ⁻⁴
Nuclear criticality	5.0x10 ⁻⁴	2.0x10 ⁻⁷	3.9x10 ⁻⁶	1.9x10 ⁻⁹	8.5x10 ⁻⁴	4.3x10 ⁻⁷ 1.0x10 ⁻⁷
Beyond evaluation basis fire	0.013	5.1x10 ⁻⁶	1.1x10 ⁻⁴	5.5x10 ⁻⁸	0.24	1.2x10 ⁻⁴ 1.0x10 ⁻⁷
Beyond evaluation basis explosion	18.6	9.2x10 ⁻³	0.16	8.0x10 ⁻⁵	346	0.17 1.0x10 ⁻⁷
Beyond evaluation basis earthquake	9.3	3.7x10 ⁻³	0.080	4.0x10 ⁻⁵	173	0.086 1.0x10 ⁻⁷
[Text deleted.]						

^a Increased likelihood (or probability) of cancer fatality to a hypothetical individual (a single onsite worker at a distance of 1,000 m or the site boundary, whichever is smaller, or to a hypothetical individual in the offsite population located at the site boundary) if exposed to the indicated dose. The value assumes the accident has occurred.

^b Estimated number of cancer fatalities in the entire offsite population out to a distance of 80 km if exposed to the indicated dose. The value assumes the accident has occurred.

Note: All values are mean values.

Source: Calculated using the source term in Tables M.5.3.2.1-4 and M.5.3.2.1-5 and the MACCS computer code.

Table M.5.3.2.4. Mixed Oxide Fuel Fabrication Facility Accident Impacts at Pantex Plant

Accident Scenario	Worker at 1,000 m		Maximum Offsite Individual		Population to 80 km	
	Dose (rem)	Probability of Cancer Fatality ^a (rem)	Dose (rem)	Probability of Cancer Fatality ^a (rem)	Dose (person·rem)	Number of Cancer Fatalities ^b
Evaluation basis fire on open loading dock	0.13	5.1x10 ⁻⁵	0.041	2.0x10 ⁻⁵	6.3	3.2x10 ⁻³
Evaluation basis fire in process cell	7.7x10 ⁻⁷	3.1x10 ⁻¹⁰	2.4x10 ⁻⁷	1.2x10 ⁻¹⁰	3.8x10 ⁻⁵	1.9x10 ⁻⁸
Leaks or spills from breach of containment	2.7x10 ⁻¹⁰	1.1x10 ⁻¹³	8.7x10 ⁻¹¹	4.3x10 ⁻¹⁴	1.3x10 ⁻⁸	6.7x10 ⁻¹²
Evaluation basis explosion inside a glovebox	1.6x10 ⁻⁴	6.4x10 ⁻⁸	5.1x10 ⁻⁵	2.6x10 ⁻⁸	7.9x10 ⁻³	3.9x10 ⁻⁶
Nuclear criticality	2.4x10 ⁻⁴	9.7x10 ⁻⁸	9.3x10 ⁻⁵	4.6x10 ⁻⁸	2.3x10 ⁻³	1.1x10 ⁻⁶
Beyond evaluation basis fire	5.5x10 ⁻³	2.2x10 ⁻⁶	1.7x10 ⁻³	8.7x10 ⁻⁷	0.27	1.3x10 ⁻⁴
Beyond evaluation basis explosion	8.0	3.3x10 ⁻³	2.6	1.3x10 ⁻³	393	0.20
Beyond evaluation basis earthquake [Text deleted.]	4.0	1.6x10 ⁻³	1.3	6.4x10 ⁻⁴	196	9.8x10 ⁻²

^a Increased likelihood (or probability) of cancer fatality to a hypothetical individual (a single onsite worker at a distance of 1,000 m or the site boundary, whichever is smaller, or to a hypothetical individual in the offsite population located at the site boundary) if exposed to the indicated dose.

^b Estimated number of cancer fatalities in the entire offsite population out to a distance of 80 km if exposed to the indicated dose. The value assumes the accident has occurred.

Note: All values are mean values.

Source: Calculated using the source term in Tables M.5.3.2.1–4 and M.5.3.2.1–5 and the MACCS computer code.

Table M.5.3.2.2-5. Mixed Oxide Fuel Fabrication Facility Accident Impacts at Oak Ridge Reservation

Accident Scenario	Worker at 801 ^a m		Maximum Offsite Individual		Population to 80 km	
	Dose (rem)	Probability of Cancer Fatality ^a	Dose (rem)	Probability of Cancer Fatality ^a	Dose (person-rem)	Number of Cancer Fatalities ^b
Evaluation basis fire on open loading dock	0.36	1.4x10 ⁻⁴	0.36	1.8x10 ⁻⁴	74	0.037
Evaluation basis fire in process cell	2.2x10 ⁻⁶	8.7x10 ⁻¹⁰	2.2x10 ⁻⁶	1.1x10 ⁻⁹	4.4x10 ⁻⁴	2.2x10 ⁻⁷
Leaks or spills from breach of containment	7.7x10 ⁻¹⁰	3.1x10 ⁻¹³	7.7x10 ⁻¹⁰	3.8x10 ⁻¹³	1.6x10 ⁻⁷	7.9x10 ⁻¹
Evaluation basis explosion inside a glovebox	4.5x10 ⁻⁴	1.8x10 ⁻⁷	4.5x10 ⁻⁴	2.3x10 ⁻⁷	0.092	4.6x10 ⁻⁵
Nuclear criticality	5.8x10 ⁻⁴	2.3x10 ⁻⁷	5.8x10 ⁻⁴	2.9x10 ⁻⁷	0.040	2.0x10 ⁻⁵
Beyond evaluation basis fire	0.015	6.2x10 ⁻⁶	0.015	7.7x10 ⁻⁶	3.2	1.6x10 ⁻³
Beyond evaluation basis explosion	22.6	0.011	22.6	0.013	4,620	2.3
Beyond evaluation basis earthquake	11.3	4.5x10 ⁻³	11.3	5.6x10 ⁻³	2,310	1.2
[Text deleted.]						

^a Increased likelihood (or probability) of cancer fatality to a hypothetical individual (a single onsite worker at a distance of 1,000 m or the site boundary [80] m for this facility at ORR), whichever is smaller, or to a hypothetical individual in the offsite population located at the site boundary) if exposed to the indicated dose. The value assumes the accident has occurred.

^b Estimated number of cancer fatalities in the entire offsite population out to a distance of 80 km if exposed to the indicated dose. The value assumes the accident has occurred.

Note: All values are mean values.

Source: Calculated using the source term in Tables M.5.3.2.1-4 and M.5.3.2.1-5 and the MACCS computer code.

Table M.5.3.2.2-6. Mixed Oxide Fuel Fabrication Facility Accident Impacts at Savannah River Site

Accident Scenario	Worker at 1,000 m		Maximum Offsite Individual		Population to 80 km	
	Dose (rem)	Probability of Cancer Fatality ^a (rem)	Dose (rem)	Probability of Cancer Fatality ^a (rem)	Dose (person-rem)	Number of Cancer Fatalities ^b
Evaluation basis fire on open loading dock	0.21	8.4x10 ⁻⁵	5.9x10 ⁻³	2.9x10 ⁻⁶	19.8	9.9x10 ⁻³
Evaluation basis fire in process cell	1.3x10 ⁻⁶	5.0x10 ⁻¹⁰	3.5x10 ⁻⁸	1.8x10 ⁻¹¹	1.2x10 ⁻⁴	5.9x10 ⁻⁸
Leaks or spills from breach of containment	4.4x10 ⁻¹⁰	1.8x10 ⁻¹³	1.2x10 ⁻¹¹	6.2x10 ⁻¹⁵	4.2x10 ⁻⁸	2.1x10 ⁻¹¹
Evaluation basis explosion inside a glovebox	2.6x10 ⁻⁴	1.0x10 ⁻⁷	7.3x10 ⁻⁶	3.7x10 ⁻⁹	0.025	1.2x10 ⁻⁵
Nuclear criticality	3.5x10 ⁻⁴	1.4x10 ⁻⁷	9.0x10 ⁻⁶	4.5x10 ⁻⁹	4.6x10 ⁻³	2.3x10 ⁻⁶
Beyond evaluation basis fire	8.9x10 ⁻³	3.6x10 ⁻⁶	2.5x10 ⁻⁴	1.2x10 ⁻⁷	0.84	4.2x10 ⁻⁴
Beyond evaluation basis explosion	13.0	5.8x10 ⁻³	0.36	1.8x10 ⁻⁴	1,240	0.62
Beyond evaluation basis earthquake [Text deleted.]	6.5	2.8x10 ⁻³	0.18	9.1x10 ⁻⁵	618	0.31

^a Increased likelihood (or probability) of cancer fatality to a hypothetical individual (a single onsite worker at a distance of 1,000 m or the site boundary, whichever is smaller, or to a hypothetical individual in the offsite population located at the site boundary) if exposed to the indicated dose. The value assumes the accident has occurred.

^b Estimated number of cancer fatalities in the entire offsite population out to a distance of 80 km if exposed to the indicated dose. The value assumes the accident has occurred.

Note: All values are mean values.

Source: Calculated using the source term in Tables M.5.3.2.1-4 and M.5.3.2.1-5 and the MACCS computer code.